

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) Miniature confocal optical head ~~(4)~~ for a confocal imaging system, in particular endoscopic, said head ~~(4)~~ comprising:

- a point source for producing a light beam (13),
~~characterized in that it also comprises:~~

- a ball lens ~~(12)~~ arranged at the end of the optical head ~~(4)~~, ~~in order to cause~~ causing said light beam ~~(13)~~ to converge into an excitation point ~~(19)~~ situated in a subsurface field under observation ~~(14)~~ of a sample ~~(15)~~, the numerical aperture of ~~this~~ the ball lens and the dimensions of the point source being suitable to ensure the confocality of the assembly, and

- scanning means ~~(10, 21, 22)~~ for displacing the point source in rotation along two axes passing through the center of the ball lens so that the excitation point ~~(19)~~ scans said field under observation,

wherein, said ball lens is partially arranged outside the body constituting the optical head such that when the optical head is positioned on the sample, the outer part of the ball lens constitutes a protuberance pushing into the sample.

2. (currently amended) Optical head according to claim 1, ~~characterized in that,~~ wherein during scanning, the point source pivots independently of the ball lens.

3. (currently amended) Optical head according to claim 2, ~~characterized in that,~~ wherein during scanning, the distance between the point source and the centre of the ball lens is kept constant so that the field under observation ~~(14)~~ is curved.

4. (currently amended) Optical head according to claim 1, ~~characterized in that,~~ wherein during scanning, the point source is integral with the ball lens.

5. (currently amended) Optical head according to claim 4, ~~characterized in that it also comprises~~ further comprising means for introducing a liquid ~~(23)~~ between the external surface of the ball lens and the sample so as to ease the sliding of the ball lens over the sample.

6. (currently amended) Optical head according to claim 4, ~~characterized in that it also comprises~~ further comprising a fine rigid curved plate used as a window designed to allow the ball lens to slide over the sample.

7. (currently amended) Optical head according to claim 4, ~~characterized in that~~ wherein the scanning means ~~(21, 22)~~ act directly on the ball lens.

8. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the scanning means ~~(10)~~ act directly on the point source.

9. (currently amended) Optical head according to claim 1, ~~characterized in that it also comprises~~ further comprising corrective optical means ~~(11)~~ integral with the point source and arranged between ~~this~~ the point source and the ball lens ~~(12)~~ in order to correct residual aberrations of the ball lens.

10. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the scanning means comprise means for carrying out scanning along two rotational axes of the ball lens so as to obtain a two-dimensional image in real time.

11. (currently amended) Optical head according to claim 10, ~~characterized in that the~~ wherein scanning along one of the two rotational axes reaches a frequency of approximately 4 kHz.

12. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the scanning means comprise micro-motors.

13. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the scanning means comprise piezoelectric elements.

14. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the scanning means comprise MEMs-type micromechanical means.

15. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the head comprises the terminal part of an optical fibre suitable for conducting the light beam from an external source, the light beam emerging from the fibre constituting the point source.

16. (currently amended) Optical head according to claim 15, ~~characterized in that~~ wherein the optical fibre is monomode with a core diameter and a numerical aperture allowing a spatial filtering of the return signal and therefore ensuring the confocality of the head.

17. (currently amended) Optical head according to claim 1, ~~characterized in that~~ wherein the point source is constituted by a VCSEL-type laser source, having a numerical aperture and a cavity outlet diameter compatible with a confocal system, and associated with a detector placed behind the VCSEL cavity.

18. (currently amended) Confocal imaging system comprising:

- a confocal optical head according to claim 1 ~~(4)~~ with integrated scanning;

- a source ~~(1, 2a, 2b)~~ suitable for emitting a light beam;

- means of ~~detection (5) of~~ detecting an emitted signal; and

- means ~~(9)~~ for electronic and computer control and processing of the emitted signal ~~emitted~~ suitable for reconstructing a confocal image of a field image, ~~characterized in that the optical head (4) is according to claim 1.~~

19. (currently amended) System according to claim 18, ~~characterized by an~~ comprising a first optical fibre ~~(2a)~~ connected to a laser source, ~~(1) and~~ coupling means ~~(3)~~ for coupling said first optical fibre ~~(2a)~~ with ~~the~~ a second optical fibre ~~(2b)~~ for transport to and from the optical head, ~~(4)~~ and a

third optical fibre (2e) for transporting the emitted signal to the detection means.

20. (currently amended) System according to claim 18, ~~characterized in that,~~ wherein the optical head ~~comprising~~ comprises a VCSEL laser source and an integrated detector, and the system comprises flexible connection means between the optical head and the signal processing means.